Atty Docket No. 8433P002C *Patent*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	Examiner:	Shi K. Li
Khoi Nhu Hoang	)	Art Unit:	2633
Application No. 10/626,055	)	Confirm. No:	1434
Filed: July 23, 2003	)		
For: QUALITY OF SERVICE BASED OPTICAL NETWORK TOPOLOGY DATABASES	)		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

This is an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner of Group 2419, mailed April 6, 2010, in which claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75 in the above-identified application were rejected in a final action. This Appeal Brief is hereby submitted pursuant to 37 C.F.R. § 41.37(a).

I. REAL PARTY IN INTEREST

The real parties in interest are the assignees of the full interest in the invention: Dynamic Method Enterprises Limited, Hong Kong.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF THE CLAIMS

Claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75 are pending in the application and were finally rejected in an Office Action mailed January 11, 2010. Claims 4, 12, 17, 22, 28-29, 45-46, 54-55, 61, 68, and 73 were canceled during prosecution. Claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75 are the subject of this appeal. A copy of Claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75 as they stand on appeal are set forth in Appendix A.

IV. STATUS OF AMENDMENTS

No amendments to the claims have been made after receipt of the Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellant's invention as claimed in claims is directed to Quality of Service based optical network topology databases [Specification, page 7, line 5].

Independent method claim 1 claims creating a plurality of separate service levels by applying a set of one or more connectivity constraints that include quality of service (QoS) based criteria on a physical network topology of a wave length division multiplexing optical network to divide said optical network into said plurality of separate service levels [Specification, Figure 9, block 915, page 23, lines 10 – 17]. Independent claim 1 further claims that the connectivity constraints are based on a conversion criteria [Specification, page 11, lines 14 – 24]. Independent claim 1 also claims determining service level topologies for each of said plurality of separate service levels for each of a plurality of access nodes in the optical network [Specification, Figure 10, page 23, line 20 – page 24, line 26]. In addition, independent claim 1 claims that each service level

topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each service level topology comprises end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Furthermore, independent claim 1 claims that an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes and that allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 1 also claims storing the plurality of service level topologies in a service level connectivity database for each access node and on that access node [Specification, Figure 10, block 1015, page 24, lines 13 – 26]. Independent claim 1 further claims that the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and that each service level topology structure references the end to end paths for that access node satisfying the corresponding service level [Specification, Figure 4, page 16, line 27 – page 17, line 14]. Independent claim 1 claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11].

Independent method claim 7 claims maintaining in each node of a wave length division multiplexing optical network a classification by QoS criteria of wavelengths for each link of the wave length division multiplexing optical network, said QoS criteria defining a plurality of service levels [Specification, Figure 5, block 510, page 18, lines 16-21]. Independent claim 7 also claims that for each of said plurality of service levels, maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria [Specification, Figure 5, block 510, page 18, lines 16-21]. Independent claim 7 further claims that each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each service level topology comprises end to end paths satisfying the corresponding service level from that

node to all other reachable nodes in said optical network as destinations [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Furthermore, independent claim 7 claims that an end to end path between two nodes is the set of two or more links and available wavelengths on that end to end path between the two nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. In addition, independent claim 7 claims updating the plurality of maintained service level topologies in a service level database for each node and on that node [Specification, Figure 5, page 20, lines 12-23]. Furthermore, independent claim 7 claims that the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and each service level topology structure references a set of end to end paths satisfying the corresponding service level [Specification, Figure 4, page 16, line 27 – page 17, line 14]. Independent claim 7 claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11].

Dependent claim 9 depends on independent claim 7 and claims tracking said wavelengths for each of said links by operating a link management protocol in each of the nodes of the optical network [Specification, page 49, lines 6-7].

Dependent claim 13 depends on independent claim 13 and claims that the conversion criteria represent the number of wavelength conversions allowable for a given optical circuit [Specification, page 18, lines 28-29].

Independent apparatus claim 14 claims a wavelength division multiplexing optical network supporting a plurality of service levels, where different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels [Specification, Figure 1, page 12, line 17 – page 13, line 10]. Independent claim 14 also claims that for at least one separate network topology database for each of said plurality of service levels that represents end to end paths between access nodes of said optical network using those of the wavelengths that qualify for that service level [Specification, Figure 4, page 16, line 27 – page 17, line 14, page 49, lines 29-32].

Independent claim 14 further claims that each access node of said optical network stores a separate one of said network topology databases for each of said plurality of service levels [Specification, Figure 10, block 1015, page 24, lines 13 – 26]. In addition, independent claim 14 claims that each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each separate network topology database stores a set of end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Furthermore, independent claim 14 claims that an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 14 also claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11]. Independent claim 14 claims that the separate network topology databases are based on a conversion criteria [Specification, page 11, lines 14 – 24].

Dependent claim 16 depends on independent claim 14 and claims that the network topology databases are stored in a centralized network server [Specification, page 21, lines 12 – 15].

Independent apparatus claim 18 claims that a wavelength division multiplexing optical network including nodes coupled by links, where the nodes include a plurality of access nodes [Specification, Figure 1, page 12, line 17 – page 13, line 10]. Independent claim 18 further claims that the wavelength division multiplexing optical network further includes, for each available wavelength on each said link of said wavelength division multiplexing optical network, a wavelength parameter for each of a set of QoS based criteria [Specification, page 11, lines 26-32]. Independent claim 18 also claims that allocated and unallocated wavelengths are considered available [Specification, page 12, lines 22 - 25]. In addition, independent claim 18 claims that the wavelength division

multiplexing optical network further includes, for each of a plurality of service levels, a service level parameter for each of said set of QoS based criteria [Specification, page 12, lines 1-5]. In addition, independent claim 18 claims that the wavelength division multiplexing optical network further includes, for each link of said optical network, a link service level channel set for each of said plurality of serviee levels representing those of the available wavelengths on that link with parameters meeting the service level parameters of that service level [Specification, Figure 2, page 13, lines 11-29]. In addition, independent claim 18 claims that the wavelength division multiplexing optical network further includes, for each access node of said optical network, a service level topology structure based on a conversion criteria for each of said plurality of service levels representing end to end paths of that access node to all other access nodes using wavelengths from the link service level ehannel sets of that service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 18 also claims that each access node stores those of said service level topology structures [Specification, Figure 10, block 1015, page 24, lines 13 – 26]. Independent claim 18 further claims that said topology structures is that includes a smaller number of end to end paths than an entire network topology of said optical network [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17].

Independent apparatus claim 24 claims an access node, to be coupled in a wavelength division multiplexing optical network [Specification, Figure 1, page 12, line 17 – page 13, line 10]. Independent claim 24 also claims that the access node includes a link state database to store, for each link connected to said access node, a link state structure to store a port of the access node to which that link is connected, available wavelengths on that link, and parameters of those wavelengths [Specification, Figure 7, block 715 and 725, page 21, line 28 – page 22, line 2]. Independent claim 24 further claims that the access node includes a service level parameter database to store, for each of a set of one or more supported service levels, a service level parameter for each of a set of QoS based criteria [Specification, Figure 7, block 710, page 22, lines 3-15]. Independent claim 24 further claims that the access node includes a service level connectivity database to store, for each of said set of service levels, a service level topology structure based on a conversion criteria that stores a representation of the

service level topology of that service level for said access node [Specification, Figure 7, block 710, page 21, line 26 – page 22, line 15]. In addition, independent claim 24 claims that the service level topology is that includes a smaller number of end to end paths than an entire network topology of said optical network, and where each of the service level topology structure references a set of end to end paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Furthermore, independent claim 24 claims that an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 24 also claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11].

Independent method claim 31 claims that for each link to an adjacent node of said wavelength division multiplexing optical network, an access node in a wavelength division multiplexing optical network classifying wavelengths on that link according to a set of one or more service level parameters for each of a plurality of service levels [Specification, Figure 5, block 510, page 18, lines 16-21]. Independent claim 31 also claims that for each of said plurality of service levels, instantiate a service level topology structure based on a conversion criterion [Specification, Figure 1005, page 23, lines 23-28]. Independent claim 31 further claims that each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network, where the service level topology structure references a set of end to end paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 31 claims that each end to end path where an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12,

lines 22 - 25]. Furthermore, independent claim 31 claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11]. Independent claim 31 also claims, responsive to receiving information regarding connectivity at each of said plurality of service levels to other access nodes in said optical network, adding such information to said service level topology structure for that service level [Specification, Figure 10, block 1015, page 24, lines 13-26].

Independent machine-readable storage device claim 37 claims a device that provides instructions that, if executed by a processor, will cause said processor to perform operations [Specification, page 21, lines 1-7]. Independent claim 37 also claims that for each link to an adjacent node of a wavelength division multiplexing optical network, classifying wavelengths on that link according to a set of one or more service level parameters for each of a plurality of service levels [Specification, Figure 5, block 510, page 18, lines 16-21]. Independent claim 37 also claims that for each of said plurality of service levels, instantiate a service level topology structure, based on a conversion criteria [Specification, Figure 1005, page 23, lines 23-28]. Independent claim 31 further claims that each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network, where the service level topology structure references a set of end to end paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 37 claims that each end to end path, where an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Furthermore, independent claim 37 claims that each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, where the set of links references available wavelengths for that possible end to end path satisfying that service level [Specification, page 17, line 2-11]. Independent claim 37 also claims, responsive to receiving information regarding connectivity at each

of said plurality of service levels to other access nodes in said optical network, adding such information to said service level topology structure for that service level [Specification, Figure 10, block 1015, page 24, lines 13-26].

Independent method claim 43 claims establishing a plurality of different service level topologies for a source node of a wavelength division multiplexing optical network in separate service level topology structures [Specification, Figure 9, page 23, lines 3-19]. Independent claim 43 further claims that each of the plurality of different service level topologies references a set of paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 43 claims that each of the set of paths for that service level references a set of links satisfying that service level on that path, where the set of links references available wavelengths for that path satisfying that service level [Specification, page 17, line 2-11]. Furthermore, independent claim 43 claims that a path between two access nodes is the set of two or more links and available wavelengths on that path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 43 also claims receiving a request for a communication path starting at the source node in said optical network [Specification, Figure 12, block 1205, page 27, lines 12-17]. Independent claim 43 further claims selecting a first of a plurality of service level corresponding to one of the plurality of different service level topologies [Specification, Figure 12, block 1210, page 27, lines 18-20]. In addition, independent claim 43 claims that the different service level topology is a network topology that includes a smaller number of paths than an entire network topology of the optical network and where the different service level topology is based on a conversion criterion [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Independent claim 43 claims selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures [Specification, Figure 12, block 1230, page 28, lines 1-8]. Furthermore, independent claim 43 claims causing allocation of the selected wavelength in the series of nodes of the selected path [Specification, Figure 12, block 1235, page 28, lines 9-17].

Independent machine-readable storage device claim 50 claims a device that provides instructions that, if executed by a processor, will cause said processor to perform operations [Specification, page 21, lines 1-7]. Independent claim 50 also claims establishing a plurality of different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures [Specification, Figure 9, page 23, lines 3-19]. Independent claim 50 further claims that each of the plurality of different service level topology references a set of paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 50 claims that each of the set of paths for that service level references a set of links satisfying that service level on that path, where the set of links references available wavelengths for that path satisfying that service level [Specification, page 17, line 2-11]. Furthermore, independent claim 50 claims that a path between two access nodes is the set of two or more links and available wavelengths on that communication path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 50 also claims, responsive to receiving a request for a communication path starting at the source node in said optical network, selecting a first of a plurality of service levels corresponding to one of the plurality of different service level topologies [Specification, Figure 12, block 1205, page 27, lines 12-17; block 1210, page 27, lines 18-20]. Independent claim 50 further claims selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures, where said separate service topology structures include a smaller number of paths than an entire network topology of said optical network [Specification, Figure 12, block 1230, page 28, lines 1-8; Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. In addition, independent claim 50 claims causing allocation of the selected wavelength in the series of nodes of the selected path [Specification, Figure 12, block 1235, page 28, lines 9-17].

Independent method claim 57 claims establishing different service level topologies for a source node of a wavelength division multiplexing optical network in separate service level topology structures [Specification, Figure 9, page 23, lines 3-19].

Independent claim 57 further claims that each separate service level topology references a set of communication paths satisfying the corresponding service level [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 57 claims that each of the set of paths for that service level references a set of links satisfying that service level on that path, where the set of links references available wavelengths for that path satisfying that service level [Specification, page 17, line 2-11]. Furthermore, independent claim 57 claims that a path between two access nodes is the set of two or more links and available wavelengths on that path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 57 also claims receiving a request to change a service provisioned with a communication path established in said optical network at one of a plurality of service levels to a different one of said plurality of service levels [Specification, page 33, lines 4-9]. Independent claim 57 further claims that said different service level topology is based on a conversion criteria [Specification, page 11, lines 14 – 24]. In addition, independent claim 57 claims selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures, where said separate service topology structure includes a smaller number of paths than an entire network topology of said optical network [Specification, Figure 12, block 1230, page 28, lines 1-8; Figure 3A-3C, page 14, line 6 – page 15, line 17]. Furthermore, independent claim 57 claims causing allocation of the selected wavelength in the series of nodes of the selected path to form a new communication path [Specification, Figure 12, block 1235, page 28, lines 9-17]. Independent claim 57 also claims transitioning said service to the new communication path [Specification, page 33, lines 4-9].

Independent machine-readable storage device claim 64 claims a device that provides instructions that, if executed by a processor, will cause said processor to perform operations [Specification, page 21, lines 1-7]. Independent claim 64 also claims establishing different service level topologies for a source node of a wavelength division multiplexing optical network in separate service level topology structures [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. In addition, independent claim 64

claims that each separate service level topology references a set of paths satisfying the corresponding service level, where each of the set of paths for that service level references a set of links satisfying that service level on that path and the set of links references available wavelengths for that path satisfying that service level, [Specification, page 17, line 2-11]. Furthermore, independent claim 64 claims that a path between two access nodes is the set of two or more links and available wavelengths on that path between the two access nodes, where allocated and unallocated wavelengths are considered available wavelengths [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 64 also claims, responsive to receiving a request to change a service provisioned with a communication path established in said optical network at one of a plurality of service levels to a different one of said plurality of service levels, selecting a path and a wavelength on said path using a database that stores, the separate service level topology structures, where said service level topology is based on a conversion criteria, where said service topology structure is includes a smaller number of end to end paths than an entire network topology of said optical network [Specification, page 33, lines 4-9; Figure 12, block 1235, page 28, lines 9-17]. Independent claim 64 further claims causing allocation of the selected wavelength in the series of nodes of the selected path to form a new communication path [Specification, Figure 12, block 1235, page 28, lines 9-17]. Independent claim 64 also claims transitioning said service to the new communication path [Specification, page 33, lines 4-9].

Independent machine-readable storage device claim 71 claims a device that provides instructions that, if executed by a processor, will cause said processor to perform operations [Specification, page 21, lines 1-7]. Independent claim 71 also claims a service level connectivity database for an access node of a wave division multiplexing optical network [Specification, Figure 7, block 702, page 21, line 26 – page 22, line 19]. Independent claim 71 further claims that each link of said optical network includes a set of zero or more lamdas for each of a plurality of service levels [Specification, page 16, lines 29-33]. Independent claim 71 claims that each of said plurality of service levels includes a set of zero of more possible end to end paths comprised of a series of two or more links that include one or more available lamdas of that service level [Specification,

page 16, lines 29-33; Figure 3A-3C, page 14, line 6 – page 15, line 17; page 12, lines 22 - 25]. Independent claim 71 also claims those allocated and unallocated lambdas are considered available lambdas [Specification, page 12, lines 22 - 25]. In addition, independent claim 71 claim that the service level connectivity database includes a separate service level topology structure for each of said plurality of service levels [Specification, Figure 7, block 710, page 21, line 26 – page 22, line 15]. Furthermore, independent claim 71 claims that said separate service topology structure includes a smaller number of end to end paths than an entire network topology of said optical network, said separate service topology structure is based on a conversion criteria [Specification, Figure 3A-3C, page 14, line 6 – page 15, line 17]. Independent claim 71 also claims that each of said plurality of service level topology structures stores the data for each of the possible end to end paths of that service level that end with said access node [Specification, Figure 10, block 1015, page 24, lines 13 – 26]. In addition, independent claim 71 claims that said service level connectivity database includes, for each of the possible end to end paths that end with said access node, data representing, the series of links of that path, and the lamdas of that path [Specification, Figure 7, block 715 and 725, page 21, line 28 – page 22, line 2; Figure 4, page 16, line 27 – page 17, line 14].

Dependent claim 74 depends on independent claim 71 and claims that each of said service level topology structures is a table [Specification, page 24, lines 20 - 26].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. Claims 1-3, 5-8, 14-15, 18-20, 23-27, 31-32, 34-38, 40-46, 49-53, 56, and 71-72 stand rejected under 35 U.S.C. § 103(a) as being rendered obvious by Golmie et al., "A Differentiated Optical Services Model for WDM Networks" in view of Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002, 23-27 June 2002, and Desnoyers et al., U.S. Patent 6,791,948.

II. Claims 9, 33, and 39 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Golmie, Jukan, Desnoyers, and Lang et al. ("Link Management Protocol," draft-ietf-mpls-lmp-02.txt, 2001).

III. Claims 10 and 11 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Golmie, Jukan, Desnoyers, and Okajima et al. (U.S. Published Patent No. 2002/0120766).

IV. Claim 13 stands stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Golmie, Jukan, Desnoyers, and Matsuura et al. (U.S. Published Patent No. 2003/0198227).

V. Claims 16 and 21 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Golmie, Jukan, Desnoyers, and Battou et al. (U.S. Patent No. 7,013,084).

VI. Claims 74 and 75 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Golmie, Jukan, Desnoyers, and Deo ("Graph Theory with Applications to Engineering and Computer Science", Prentice Hall, 1974, p. 137-144).

VII. Claims 30, 57-60, 62-67, and 69-70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Golmie, Jukan, and Desnoyers in view of Melaku et al., US Patent Publication No. 2003/0074443.

VII. ARGUMENTS

I. Claims 1-3, 5-8, 14-15, 18-20, 23-27, 31-32, 34-38, 40-46, 49-53, 56, and 71-72 stand rejected under 35 U.S.C. § 103(a) are Patentable over Golmie, Jukan, and Desnoyers, because the combination of Golmie, Jukan, and Desnoyers does not teach or suggest all elements in the claims.

A. Claims 1-3, 5-6, 18-20, 23-27, 31-32, 34-38, 40-46, 49-53, and 56 stand or fall together. Claim 1 is the representative claim.

Golmie describes "a QoS service model in the optical domain … based on a set of optical parameters that captures the quality and reliability of the optical lightpath." (Golmie, Abstract and Table 1.) An optical lightpath is "an optical communication channel, traversing one or more optical links, between a source-destination pair." (Golmie, Page 69, Left column.) Golmie classifies lightpaths (not individual wavelengths or paths) based on QoS and these classes for example "consist[] of three alternate lightpaths between a single source-destination pair accessible at the WADM, each with a unique DoS class, labeled class 1, class 2, and class 3, containing wavelength groups (λ_1, λ_2), (λ_3, λ_4), and (λ_5, λ_6) respectively… All lightpaths in a DoS class have equivalent quality of optical service between a source-destination pair." (Golmie, page 72, Left column.) Golmie is silent on how to determine service level topologies. (See Office Action, page 3.).

Jukan discloses flood based path allocation for dynamic routing and wavelength allocation in optical networks based on wavelength dense multiplexing (Jukan, Abstract). Path allocation involves selecting the best path from a source node to a destination node and allocating the selected path (Jukan, p. 832, 1st column). The path selection incorporates service-specific path quality attributes, such as physical layer impairments, reliability, policy, and traffic conditions (Jukan, Abstract). A node gathers state information about possible paths for one service level from the source node to the one destination node by flooding probe messages to each and every node in the network (Jukan, p. 831, 1st column). Each probe message includes a source node ID, destination node ID, and an initial path sequence (Jukan, p. 831, 2nd column). Each node other than the destination node receives the probe message, adds unallocated wavelength

information to the probe messages, and forwards the updated probe message to neighbor nodes that have not received the probe message (Jukan, p. 831, 2nd column – p. 832, 1st column). The destination node receives the updated probe messages and selects the best path (Jukan, p. 832, 1st column). The destination node sends an acknowledge message back to the source node along the selected best path for the purpose of resource allocation along the selected path (Jukan, p. 832, 1st column). Furthermore, Jukan discloses that this flood based path allocation is inefficient because the number of necessary message updates scales as N!, with N being the number of nodes in the network (Jukan, p. 832, 1st column).

Desnoyers discloses computers that discover a computer network topology, in a network comprising computers and switching nodes in an electrically switched network (Desnoyers, Abstract). The computers, but not the switching nodes, determine the network topology in an iterative fashion by sending out identification request messages specifically to different other computers and switches in the network (Desnoyers, Col. 5, lines 10-20). Each newly discovered switch responds with an identification response message identifying the port the identification request message was received on (Desnoyers, Col. 6, lines 48-53). The requesting computer uses the received responses to generate network topology information (Desnoyers, Col. 5, lines 3-9).

In addition, Desnoyers discloses that the computers should build the network topology information because the switching nodes do not have the requisite processing and storage resources to determine and store a network topology (Desnoyers, Col. 2, lines 39-50).

Furthermore, Desnoyers discloses that the network topology information comprises "the group of switching nodes comprising the network, the pattern of communication links 13(p) interconnecting the switching nodes 11(n), and the pattern of communication links interconnecting the switching nodes and respective ones of the computers 12(m)" (Desnoyers, Col. 4, line 66 – Col. 5, line 3). Desnoyers does not disclose the structure of the network topology database or topologies for different service levels.

Thus, the combination of Golmie, Jukan, and Desnoyers is a QoS service model in the optical domain based on a set of optical parameters that captures the quality and

reliability of an optical <u>lightpath</u> (not paths and wavelengths individually), using a messaging system to discover paths between one source-destination pair, and having remote computers discover the electrically switched network topology.

Claim 1 recites:

> A method comprising:
>
> creating a plurality of separate service levels by applying a set of one or more connectivity constraints that include quality of service (QoS) based criteria on a physical network topology of a wave length division multiplexing optical network to divide said optical network into said plurality of separate service levels, wherein the connectivity constraints are based on a conversion criteria;
>
> <u>determining service level topologies for each of said plurality of separate service levels for each of a plurality of access nodes</u> in the optical network, wherein each service level topology is a network topology smaller than an entire network topology of the optical network and <u>said each service level topology comprises end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations</u>, wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths; and
>
> <u>storing the plurality of service level topologies in a service level connectivity database for each access node</u> and on that access node, wherein <u>the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and each service level topology structure references the end to end paths for that access node satisfying the corresponding service level</u>, wherein <u>each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path</u>, wherein <u>the set of links references available wavelengths for that possible end to end path satisfying that service level</u>.

(Claim 1, emphasis added)

As stated in the Office Action, the Examiner admits that Golmie does not teach or suggest determining service level topologies. (Office Action, Page 3.) Instead, the Examiner relies on Jukan as disclosing this claim element. The Examiner asserts that because Jukan discloses distributed discovery of wavelength paths, the combination of Jukan and Golmie discloses determining service level topologies. Appellant respectfully disagrees. <u>Jukan discloses discovering paths between a single source destination pair for</u>

one requested service. Thus, because Jukan discloses discovering paths for only one service and one service destination pair but not determining service level topologies for multiple service levels, where each service level topology includes end-to-end paths from one source to all reachable destinations, Jukan does not disclose "determining service level topologies … said each service level topology comprises end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations." Therefore, Appellant respectfully submits that the combination of Golmie and Jukan does not teach or suggest this claim element.

Furthermore, because Desnoyers does not teach or suggest service level topologies, Desnoyers cannot teach or suggest the claim element. Thus, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "determining service level topologies … said each service level topology comprises end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations" as claimed in claim 1.

Furthermore, none of Golmie, Jukan, or Desnoyers discloses any particular structure of a network topology database. In the Office Action, the Examiner asserts that the combination discloses storing end-to-end paths. However, Appellant respectfully submits that disclosing storing end-to-end paths does imply any particular network database structures. Furthermore, the Examiner does not cite any section Golmie, Jukan, or Desnoyers that discuss the particular structure of the network topology database. Thus, Appellant respectfully submits that the Examiner has not demonstrated how any of Golmie, Jukan, or Desnoyers teaches or suggests Appellants' particular claimed structure for service level topologies stored in a service level connectivity database.

Therefore, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "storing the plurality of service level topologies in a service level connectivity database … a service level topology structure for each of the plurality of service level topologies and each service level topology structure references the end to end paths for that access node satisfying the corresponding service level, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths

for that possible end to end path satisfying that service level" as claimed in independent claim 1.

In addition, storing service level topology structures that each reference a set of end to end paths satisfying the corresponding service level is not obvious to one of skill in the art. In order to support an obvious rejection, the Examiner must show that the difference between the prior art cited and the claimed invention would have been obvious to one of ordinary skill in the art (Fed. Reg. Vol. 72, No. 195, p. 57528). One example of one of skill in the art can be found in the well-known Open Shortest Path First (OSPF) protocol. (See, e.g. J. Moy, RFC-2328, "OSPF Version 2", IETF, April 1998). Although Moy is not cited in the Examiner's Office Action, Appellant discusses Moy as an example of the level of one of ordinary skill in the art to demonstrate that it would not be obvious to one of skill in the art to store service level topology structure in light of the teachings of Golmie, Jukan, and Desnoyers.

Moy discloses that OSPF databases and Shortest Path First (SPF) trees are not portioned into separate structures based on service level. It should be noted that the since OSPF is a protocol typically used in optically networking to create topology databases, Moy would be considered one of skill in the art. Furthermore, even though it may have known at the time of Moy that a database may be organized in a different fashion, Moy (and others who use OSPF) chose to organize the topology database as a link/lambda state database and/or a link/lambda SPF tree, instead of a topology database with partitioned based on service level. Thus, because Moy organized the OSPF database(s) differently than Appellant's topology database and Moy is one of ordinary skill in the art, it would not have been obvious to one of skill in the art to try to store separate service level topology structures that reference a set of end to end paths satisfying the corresponding service level. Therefore, Appellant's respectfully submit that the difference between the cited prior art and the claimed invention would not have been obvious to one of ordinary skill in the art.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 1. Therefore, Appellant respectfully submits that the

combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as rendering obvious Appellant's claim 1.

B. Claims 7 and 8 stand or fall together. Claim 7 is the representative claim.

Claim 7 recites:

A method comprising:

maintaining in each node of a wave length division multiplexing optical network a classification by QoS criteria of wavelengths for each link of the wave length division multiplexing optical network, said QoS criteria defining a plurality of service levels;

for each of said plurality of service levels, maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, wherein an end to end path between two nodes is the set of two or more links and available wavelengths on that end to end path between the two nodes, wherein allocated and unallocated wavelengths are considered available wavelengths; and

updating the plurality of maintained service level topologies in a service level database for each node and on that node, wherein the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and each service level topology structure references a set of end to end paths satisfying the corresponding service level, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level.

(Claim 7)(emphasis added).

In claim 7, Appellant claims "maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, … said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, … the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies." For

similar reason above, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers does not teach or suggest this claim element.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 7. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as rendering obvious Appellant's claim 7.

C. Claims 14 and 15 stand or fall together. Claim 14 is the representative claim. Claim 14 recites:

An apparatus comprising:

a wavelength division multiplexing optical network supporting a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels; and

at least one separate network topology database for each of said plurality of service levels that represents end to end paths between access nodes of said optical network using those of the wavelengths that qualify for that service level, wherein each access node of said optical network stores a separate one of said network topology databases for each of said plurality of service levels, and wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each separate network topology database stores a set of end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations, wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path

satisfying that service level, wherein the separate network topology databases are based on a conversion criteria.

(Claim 14)(emphasis added).

In claim 14, Appellant claims "<u>at least one separate network topology database for each of said plurality of service levels</u> … <u>said each separate network topology database stores a set of end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations</u>." For similar reason above, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers does not teach or suggest this claim element.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 14. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as rendering obvious Appellant's claim 14.

D. Claims 71 and 72 stand or fall together. Claim 71 is the representative claim.

Claim 71 recites:

A machine-readable storage device having stored thereon data comprising:
a service level connectivity database for an access node of a wave division multiplexing optical network, wherein each link of said optical network includes a set of zero or more lamdas for each of a plurality of service levels, each of said plurality of service levels includes a set of zero of more possible end to end paths comprised of a series of two or more links that include one or more available lamdas of that service level, wherein allocated and unallocated lambda are considered available lambdas, wherein <u>the service level connectivity database includes a separate service level topology structure for each of said plurality of service levels</u>, wherein said separate service topology structure includes a smaller number of end to end paths than an entire network topology of said optical network, said separate service topology structure is based on a conversion criteria, <u>each of said plurality of service level topology structures storing the data for each of the possible end to end paths of that service level that end with said access node</u>, said service level connectivity database including,

for each of the possible end to end paths that end with said access node, data representing,

the series of links of that path; and

the lamdas of that path.

(Claim 71, as amended).

In claim 71, Appellant claims that "the service level connectivity database includes a separate service level topology structure for each of said plurality of service levels, ... each of said plurality of service level topology structures storing the data for each of the possible end to end paths of that service level that end with said access node." For similar reason above, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers does not teach or suggest this claim element.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 71. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, and Desnoyers cannot be properly interpreted as rendering obvious Appellant's claim 71.

II. Claims 9, 33, and 39 are Patentable over 35 U.S.C. § 103(a) over the combination of Golmie, Jukan, Desnoyers, and Lang, because the combination of Golmie, Jukan, Desnoyers, and Lang does not teach or suggest all the limitations of the claims.

A. Claims 9, 33, and 39 stand or fall together. Claim 9 depends on independent claim 7 and is the representative claim.

Lang discloses a link management protocol that is used for link provisioning and fault isolation.

Claim 9 depends on independent claim 7. As per above, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, ... said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, ... the service level connectivity database includes a service level topology structure for each of the plurality of service

level topologies" as claimed in Appellant's claim 7. Because Lang is directed to a link management protocol for link provisioning and fault isolation and not to service level topologies, Lang cannot be properly interpreted as teaching or suggesting this claim element of Appellant's claim 7.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Lang cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 9. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, Desnoyers, and Lang cannot be properly interpreted as rendering obvious Appellant's claim 9.

111. <u>Claims 10 and 11 are Patentable over 35 U.S.C. § 103(a) over the combination of Golmie, Jukan, Desnoyers, and Okajima, because the combination of Golmie, Jukan, Desnoyers, and Okajima does not teach or suggest all the limitations of the claims.</u>

A. Claims 10 and 11 stand or fall together. Claim 10 depends on independent claim 7 and is the representative claim.

Okajima discloses a link manager that detects when a link is installed and the characteristics of the installed link.

Claim 10 depends on independent claim 7. As per above, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, … said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, … the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies" as claimed in Appellant's claim 7. Because Okajima is directed to a link manager that detects when a link is installed and the characteristics of the installed link and not to service level topologies, Okajima cannot be properly interpreted as teaching or suggesting this claim element of Appellant's claim 7.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Okajima cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 10. Therefore, Appellant respectfully submits that

the combination of Golmie, Jukan, Desnoyers, and Okajima cannot be properly interpreted as rendering obvious Appellant's claim 10.

IV. Claim 13 is Patentable over 35 U.S.C. § 103(a) over the combination of Golmie, Jukan, Desnoyers, and Matsuura, because the combination of Golmie, Jukan, Desnoyers, and Matsuura does not teach or suggest all the limitations of the claims.

A. Claim 13 depends on independent claim 7 and is the representative claim.

Matsuura discloses a method of setting up an optical path that minimizes wavelength conversion. Optical paths are reserved by using the Resource Reservation Protocol.

Claim 13 depends on independent claim 7. As per above, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, … said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, … the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies" as claimed in Appellant's claim 7. Because Matsuura is directed to reserving optical paths and not to service level topologies, Matsuura cannot be properly interpreted as teaching or suggesting this claim element of Appellant's claim 7.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Matsuura cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 10. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, Desnoyers, and Matsuura cannot be properly interpreted as rendering obvious Appellant's claim 10.

V. <u>Claims 16 and 21 are Patentable over 35 U.S.C. § 103(a) over the combination of Golmie, Jukan, Desnoyers, and Battou, because the combination of Golmie, Jukan, Desnoyers, and Battou does not teach or suggest all the limitations of the claims.</u>

A. Claims 16 and 21 stand or fall together. Claim 16 depends on independent claim 14 and is the representative claim.

Battou discloses hierarchical and distributed control architecture for managing an optical communications network (Battou, Abstract). The architecture includes a line card manager level for managing individual line cards in an optical switch, a node manager level for managing multiple line cards in an optical switch/node, and a network management system level for managing multiple optical switches/nodes in a network (Battou, Fig. 34, col. 34, lines 40-55). An event manager at the node manager level enables software components that are running at the node manager to register for and receive events, and to post events (Battou, Fig. 44, col. 40, lines 48-55). The events may be triggered, e.g., by a change in a status of the switch, or an alarm condition (Battou, col. 40, lines 56-66). Control architecture functionalities include signaling, routing, protection switching and network management (Battou, col. Fig. 34, col. 34, lines 40-55). Furthermore, the network management function includes a topology manager, a performance manager, a connection manager, a fault detection manager, and a configuration manager (Battou, col. Fig. 34, col. 34, lines 40-55).

Claim 16 depends on claim 14. As per above, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "at least one separate network topology database for each of said plurality of service levels … said each separate network topology database stores a set of end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations" as claimed in Appellant's claim 14. Because Battou is directed to a centralized control architecture and does not disclose service level topologies, Battou cannot be properly interpreted as teaching or suggesting this claim element of Appellant's claim 14.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Battou cannot be properly interpreted as teaching or suggesting each and

every element as claimed in claim 16. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, Desnoyers, and Battou cannot be properly interpreted as rendering obvious Appellant's claim 16.

VI. Claims 74 and 75 are Patentable over 35 U.S.C. § 103(a over the combination of Golmie, Jukan, Desnoyers, and Deo, because the combination of Golmie, Jukan, Desnoyers, and Deo does not teach or suggest all the limitations of the claims.

A. Claims 74 and 75 stand or fall together. Claim 74 depends on independent claim 71 and is the representative claim.

Deo discloses matrix representation of graphs.

Claim 74 depends on independent claim 71. As per above, the combination of Golmie, Jukan, and Desnoyers does not teach or suggest "the service level connectivity database includes a separate service level topology structure for each of said plurality of service levels, … each of said plurality of service level topology structures storing the data for each of the possible end to end paths of that service level that end with said access node" as claimed in Appellant's claim 71. Because Deo is directed to a matrix representation of graphs and does not disclose service level topologies, Deo cannot be properly interpreted as teaching or suggesting this claim element of Appellant's claim 71.

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Deo cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 74. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, Desnoyers, and Deo cannot be properly interpreted as rendering obvious Appellant's claim 74.

VII. Claims 30, 57-60, 62-67, and 69-70 are Patentable over 35 U.S.C. § 103(a) over the combination of Golmie, Jukan, Desnoyers, and Melaku, because the combination of Golmie, Jukan, Desnoyers, and Melaku does not teach or suggest all the limitations of the claims.

Claims 30, 57-60, 62-67, and 69-70 stand or fall together. Independent claim 57 is the representative claim.

Melaku describes rerouting traffic to a different path based on a change in QoS requirements. (Melaku, Paragraph 0056.) "If the user decides to change QoS requirements in the midst of a session, the LMQB [Last Mile QoS Broker] dynamically updates the database [of the LMQB] and re-allocates new resources and establishes a path that meets the requested quality of service." (Melaku, Paragraph 0056.)

The combination of Golmie, Jukan, Desnoyers, and Melaku does not describe what Appellants require in independent claim 57. Because Melaku is directed to a QoS broker, Melaku does not teach or suggest service level topologies. As per above, neither do Golmie, Jukan, or Desnoyers.

For example, claim 57, as amended, requires "establishing different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures, wherein each separate service level topology references a set of communication paths satisfying the corresponding service level, wherein each of the set of paths for that service level references a set of links satisfying that service level on that path, wherein the set of links references available wavelengths for that path satisfying that service level."

Thus, Appellant respectfully submits that combination of Golmie, Jukan, Desnoyers, and Melaku cannot be properly interpreted as teaching or suggesting each and every element as claimed in claim 57. Therefore, Appellant respectfully submits that the combination of Golmie, Jukan, Desnoyers, and Melaku cannot be properly interpreted as rendering obvious Appellant's claim 57.

VIII. CONCLUSION

Appellant's claims 1-3, 5-8, 14-15, 18-20, 23-27, 31-32, 34-38, 40-46, 49-53, 56, and 71-72 are patentable because the combination of Golmie, Jukan, and Desnoyers does not teach or suggest all limitations in the claims. In addition, Appellant's claims 9, 33, and 39 are patentable because the combination of Golmie, Jukan, Desnoyers, and Lang does not teach or suggest all limitations in the claims. Furthermore, Appellant's claims 10 and 11 are patentable because the combination of Golmie, Jukan, Desnoyers, and

Okajima does not teach or suggest all limitations in the claims. Appellant's claims 16 and 21 are patentable because the combination of Golmie, Jukan, Desnoyers, and Battou does not teach or suggest all limitations in the claims. Appellant's claim 13 is patentable because the combination of Golmie, Jukan, Desnoyers, and Matsuura does not teach or suggest all limitations in the claim. Appellant's claims 74 and 75 are patentable because the combination of Golmie, Jukan, Desnoyers, and Deo does not teach or suggest all limitations in the claims. Appellant's claims 30, 57-60, 62-67, and 69-70 are patentable because the combination of Golmie, Jukan, Desnoyers, and Melaku does not teach or suggest all limitations in the claims. Accordingly, Appellant respectfully requests the Board reverse the rejections of claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75 under 35 U.S.C. § 103(a), and direct the Examiner to enter a Notice of Allowance for claims 1-3, 5-11, 13-16, 18-21, 23-27, 30-46, 49-53, 56-60, 62-67, 69-72, 74, and 75.

Fee for Filing a Brief in Support of Appeal

Enclosed is a check in the amount of $540.00 to cover the fee for filing a brief in support of an appeal as required under 37 C.F.R. §§ 1.17(c) and 41.37(a).

Deposit Account Authorization

Authorization is hereby given to charge our Deposit Account No. 02-2666 for any charges that may be due. Furthermore, if an extension is required, then Appellant hereby requests such extension.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR
& ZAFMAN LLP

Dated: September 7, 2010

Eric S. Replogle
Attorney for Appellant
Registration No. 52,161

1279 Oakmead Parkway
Sunnyvale, CA 94085-4040

CERTIFICATE OF TRANSMISSION
I hereby certify that this document is being submitted via EFS-WEB
on: September 7, 2010
Assistant: /Carla Anysia Nascimento/

CLAIMS APPENDIX

1.(Previously Presented) A method comprising:

creating a plurality of separate service levels by applying a set of one or more connectivity constraints that include quality of service (QoS) based criteria on a physical network topology of a wave length division multiplexing optical network to divide said optical network into said plurality of separate service levels, wherein the connectivity constraints are based on a conversion criteria;

determining service level topologies for each of said plurality of separate service levels for each of a plurality of access nodes in the optical network, wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each service level topology comprises end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations, wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths; and

storing the plurality of service level topologies in a service level connectivity database for each access node and on that access node, wherein the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and each service level topology structure references the end to end paths for that access node satisfying the corresponding service level, wherein each of the set of end to end paths for that service level references a set of links satisfying that

service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level.

2. (Original) The method of claim 1, wherein said QoS based criteria includes one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

3. (Original) The method of claim 1, wherein said determining includes determining, for each service level, a service level topology for the network.

4. (Cancelled)

5. (Original) The method of claim 1, wherein said set of connectivity constraints also includes a set of one or more conversion criteria.

6. (Original) The method of claim 1, wherein said set of connectivity constraints also includes a conversion free connectivity constraint.

7. (Previously Presented) A method comprising:

maintaining in each node of a wave length division multiplexing optical network a classification by QoS criteria of wavelengths for each link of the wave length division multiplexing optical network, said QoS criteria defining a plurality of service levels;

for each of said plurality of service levels, maintaining a service level topology from each node to other nodes of the wave length division multiplexing optical network based on a conversion criteria, wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each service level topology comprises end to end paths satisfying the corresponding service level from that node to all other reachable nodes in said optical network as destinations, wherein an end to end path between two nodes is the set of two or more links and available wavelengths on that end to end path between the two nodes, wherein allocated and unallocated wavelengths are considered available wavelengths; and

updating the plurality of maintained service level topologies in a service level database for each node and on that node, wherein the service level connectivity database includes a service level topology structure for each of the plurality of service level topologies and each service level topology structure references a set of end to end paths satisfying the corresponding service level, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level.

8. (Original) The method of claim 7, wherein said QoS based criteria includes one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

9. (Original) The method of claim 7, further comprising:

tracking said wavelengths for each of said links by operating a link management protocol in each of the nodes of the optical network.

10. (Original) The method of claim 7, wherein said maintaining said classification includes comparing parameters of each of the wavelengths to service level parameters, wherein there is a service level parameter for each of said plurality of service levels for each of said QoS criteria.

11. (Original) The method of claim 10, wherein said maintaining said classification includes each node of said optical network performing said comparing.

12. (Canceled)

13. (Previously Presented) The method of claim 7, wherein said conversion criteria represents the number of wavelength conversion-s allowable for a given optical circuit.

14. (Previously Presented) An apparatus comprising:

a wavelength division multiplexing optical network supporting a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels; and

at least one separate network topology database for each of said plurality of service levels that represents end to end paths between access nodes of said optical network using those of the wavelengths that qualify for that

service level, wherein each access node of said optical network stores a separate one of said network topology databases for each of said plurality of service levels, and wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network and said each separate network topology database stores a set of end to end paths satisfying the corresponding service level from that access node to all other reachable access nodes in said optical network as destinations, wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level, wherein the separate network topology databases are based on a conversion criteria.

15. (Original) The apparatus of claim 14, wherein the connectivity is conversion free connectivity.

16. (Original) The apparatus of claim 14, wherein said network topology databases are stored in a centralized network server.

17. (Cancelled)

18. (Previously Presented) An apparatus comprising:

a wavelength division multiplexing optical network including nodes coupled by links, wherein the nodes include a plurality of access nodes, the wavelength division multiplexing optical network further including:

for each available wavelength on each said link of said wavelength division multiplexing optical network, a wavelength parameter for each of a set of QoS based criteria, wherein allocated and unallocated wavelengths are considered available;

for each of a plurality of service levels, a service level parameter for each of said set of QoS based criteria;

for each link of said optical network, a link service level channel set for each of said plurality of service levels representing those of the available wavelengths on that link with parameters meeting the service level parameters of that service level; and

for each access node of said optical network, a service level topology structure based on a conversion criteria for each of said plurality of service levels representing end to end paths of that access node to all other access nodes using wavelengths from the link service level channel sets of that service level, wherein each access node stores those of said service level topology structures, and wherein said topology structures is that includes a smaller number of end to end paths than an entire network topology of said optical network.

19. (Original) The apparatus of claim 18, wherein said QoS based criteria includes one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

20. (Original) The apparatus of claim 18, wherein each access node of said optical network stores the link service level channel sets of those of the links connected to that access node.

21. (Original) The apparatus of claim 18, wherein said service level topology structures are stored in a centralized network server.

22. (Cancelled)

23. (Original) The apparatus of claim 18, wherein each of said service level topology structures stores those paths for which the intersection of the link service level channel sets of the links of that path is not null.

24. (Previously Presented) An apparatus comprising:

an access node, to be coupled in a wavelength division multiplexing optical network, including,

a link state database to store, for each link connected to said access node, a link state structure to store a port of the access node to which that link is connected, available wavelengths on that link, and parameters of those wavelengths;

a service level parameter database to store, for each of a set of one or more supported service levels, a service level parameter for each of a set of QoS based criteria; and

a service level connectivity database to store, for each of said set of service levels, a service level topology structure based on a conversion criteria that stores a representation of the service level topology of that service level for said access node, wherein the service level topology is that includes a smaller number of end to end paths than an entire network topology of said optical network, and wherein each of the service level topology structure references a set of end to end paths satisfying the corresponding service level, whercin each end to end path wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level.

25. (Original) The apparatus of claim 24, wherein said QoS based criteria includes one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

26. (Original) The apparatus of claim 24, wherein each of said service level topology structures stores paths to those of other access nodes of said optical network that can be reached with those of said wavelengths that qualify for the service level of that service level topology structure.

27. (Original) The apparatus of claim 24, wherein each of said service level topology structures stores available paths to other access nodes in said optical network.

28. (Canceled)

29. (Canceled)

30. (Original) The apparatus of claim 24, wherein said access nodes also includes a set of one or more modules to, responsive to request to change the service level of a given provisioned service, allocate a new communication path at a different one of the service levels than a previous communication path, begin routing traffic of the service on the new communication path, and deallocate the previous communication path.

31. (Previously Presented) A method for an access node of a wavelength division multiplexing optical network, said method comprising:

for each link to an adjacent node of said wavelength division multiplexing optical network, said access node classifying wavelengths on that link according to a set of one or more service level parameters for each of a plurality of service levels;

for each of said plurality of service levels, instantiate a service level topology structure based on a conversion criteria, wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network, and

wherein the service level topology structure references a set of end to end paths satisfying the corresponding service level, wherein each end to end path wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level; and

responsive to receiving information regarding connectivity at each of said plurality of service levels to other access nodes in said optical network, adding such information to said service level topology structure for that service level.

32. (Original) The method of claim 31, wherein said classifying is based on one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

33. (Previously Presented) The method of claim 31, further comprising:

for each link to an adjacent node, tracking said available wavelengths by operating a link management protocol.

34. (Previously Presented) The method of claim 31, wherein said classifying includes comparing parameters of each of the available wavelengths to the sets of service level parameters.

35. (Previously Presented) The method of claim 31, wherein said adding includes, for each of said service level topology structures, storing paths to those of other access nodes of said optical network that can be reached with those of said available wavelengths that qualify for the service level of that service level topology structure.

36. (Previously Presented) The method of claim 35, wherein each of said paths is a series of two or more nodes connected by links on which there are available wavelengths at the service level of that path.

37. (Previously Presented) A machine-readable storage device that provides instructions that, if executed by a processor, will cause said processor to perform operations comprising:

for each link to an adjacent node of a wavelength division multiplexing optical network, classifying wavelengths on that link according to a set of one or more service level parameters for each of a plurality of service levels;

for each of said plurality of service levels, instantiate a service level topology structure, based on a conversion criteria wherein each service level topology is a network topology that includes a smaller number of end to end paths than an entire network topology of the optical network, and wherein the service level topology structure references a set of end to end paths satisfying the corresponding service level, wherein each end to end path, wherein an end to end path between two access nodes is the set of two or more links and available wavelengths on that end to end path between the two access nodes, wherein allocated and unallocated

wavelengths are considered available wavelengths, wherein each of the set of end to end paths for that service level references a set of links satisfying that service level on that possible end to end path, wherein the set of links references available wavelengths for that possible end to end path satisfying that service level; and

responsive to receiving information regarding connectivity at each of said plurality of service levels to other access nodes in said optical network, adding such information to said service level topology structure for that service level.

38. (Previously Presented) The machine-readable storage device of claim 37, wherein said classifying is based on one or more of bandwidth, bit error rate, optical signal to noise ration, peak noise level, and re-routing priority.

39. (Previously Presented) The machine-readable storage device of claim 37, the operations further comprising:

for each link to an adjacent node, tracking said available wavelengths by operating a link management protocol.

40. (Previously Presented) The machine-readable storage device of claim 37, wherein said classifying includes comparing parameters of each of the available wavelengths to the sets of service level parameters.

41. (Previously Presented) The machine-readable storage device of claim 37, wherein said adding includes, for each of said service level topology structures, storing paths to

those of other access nodes of said optical network that can be reached with those of said available wavelengths that qualify for the service level of that service level topology structure.

42. (Previously Presented) The machine-readable storage device of claim 41, wherein each of said paths is a series of two or more nodes connected by links on which there are available wavelengths at the service level of that path.

43. (Previously Presented) A method comprising:

establishing a plurality of different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures, wherein each of the plurality of different service level topologies references a set of paths satisfying the corresponding service level, wherein each of the set of paths for that service level references a set of links satisfying that service level on that path, wherein the set of links references available wavelengths for that path satisfying that service level, wherein a path between two access nodes is the set of two or more links and available wavelengths on that path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths;

receiving a request for a communication path starting at the source node in said optical network;

selecting a first of a plurality of service level corresponding to one of the plurality of different service level topologies, wherein the different service level topology is a network topology that includes a smaller number of paths

than an entire network topology of the optical network and wherein the different service level topology is based on a conversion criteria;

selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures; and

causing allocation of the selected wavelength in the series of nodes of the selected path.

44. (Original) The method of claim 43, wherein said communication path is a lightpath.

45. (Original) The method of claim 43, wherein said communication path is an optical circuit.

46. (Original) The method of claim 43, wherein said selecting said path and said allocation is performed in real time.

47. (Canceled)

48. (Canceled)

49. (Original) The method of claim 43, wherein said database stores, for each of the plurality of service levels, a representation of available conversion free paths from the source node to other access nodes in said optical network.

50. (Previously Presented) A machine-readable storage device that provides instructions that, if executed by a processor, will cause said processor to perform operations comprising:

establishing a plurality of different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures, wherein each of the plurality of different service level topology references a set of paths satisfying the corresponding service level, wherein each of the set of paths for that service level references a set of links satisfying that service level on that path, wherein the set of links references available wavelengths for that path satisfying that service level, wherein a path between two access nodes is the set of two or more links and available wavelengths on that communication path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths;

responsive to receiving a request for a communication path starting at the source node in said optical network, selecting a first of a plurality of service levels corresponding to one of the plurality of different service level topologies;

selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures, and wherein said separate service topology structures include a smaller number of paths than an entire network topology of said optical network; and

causing allocation of the selected wavelength in the series of nodes of the selected path.

51. (Previously Presented) The machine-readable storage device of claim 50, wherein said communication path is a lightpath.

52. (Previously Presented) The machine-readable storage device of claim 50, wherein said communication path is an optical circuit.

53. (Previously Presented) The machine-readable storage device of claim 50, wherein said sclecting said path and said allocation is performed in real time.

54. (Canceled)

55. (Canceled)

56. (Previously Presented) The machine-readable storage device of claim 50, wherein said database stores, for each of the plurality of service levels, a representation of available conversion free paths from the source node to other access nodes in said optical network.

57. (Previously Presented) A method comprising:

establishing different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures, wherein each separate service level topology references a set of communication paths satisfying the corresponding service level, wherein each of the set of paths for that service level references a set of links

satisfying that service level on that path, wherein the set of links references available wavelengths for that path satisfying that service level, wherein a path between two access nodes is the set of two or more links and available wavelengths on that path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths;

receiving a request to change a service provisioned with a communication path established in said optical network at one of a plurality of service levels to a different one of said plurality of service levels, and wherein said different service level topology is based on a conversion criteria;

selecting one of the paths and a wavelength on that path using a database that stores, for each of the plurality of service levels, the separate service level topology structures, wherein said separate service topology structure includes a smaller number of paths than an entire network topology of said optical network;

causing allocation of the selected wavelength in the series of nodes of the selected path to form a new communication path; and

transitioning said service to the new communication path.

58. (Original) The method of claim 57, wherein said communication path is a lightpath.

59. (Original) The method of claim 57, wherein said communication path is an optical circuit.

60. (Original) The method of claim 57, wherein said selecting said path and said allocation is performed in real time.

61. (Cancelled)

62. (Original) The method of claim 57, wherein said database stores, for each of the plurality of service levels, a representation of available conversion free paths from the source node of said communication path to other access nodes in said optical network.

63. (Original) The method of claim 57, wherein said transitioning includes:

moving traffic from the previous communication path to the new communication path; and

deallocating the previous communication path.

64. (Previously Presented) A machine-readable storage device that provides instructions that, if executed by a processor, will cause said processor to perform operations comprising:

establishing different service level topologies for a source node of an wavelength division multiplexing optical network in separate service level topology structures, wherein each separate service level topology references a set of paths satisfying the corresponding service level, wherein each of the set of paths for that service level references a set of links satisfying that service level on that path, wherein the set of links references available wavelengths for that path satisfying that service level, wherein a path between two access nodes is the set of two or more links and available

wavelengths on that path between the two access nodes, wherein allocated and unallocated wavelengths are considered available wavelengths;

responsive to receiving a request to change a service provisioned with a communication path established in said optical network at one of a plurality of service levels to a different one of said plurality of service levels, selecting a path and a wavelength on said path using a database that stores, the separate service level topology structures, and wherein said service level topology is based on a conversion criteria, and wherein said service topology structure is includes a smaller number of end to end paths than an entire network topology of said optical network;

causing allocation of the selected wavelength in the series of nodes of the selected path to form a new communication path; and

transitioning said service to the new communication path.

65. (Previously Presented) The machine-readable storage device of claim 64, wherein said communication path is a lightpath.

66. (Previously Presented) The machine-readable storage device of claim 64, wherein said communication path is an optical circuit.

67. (Previously Presented) The machine-readable storage device of claim 64, wherein said selecting said path and said allocation is performed in real time.

68. (Cancelled)

69. (Previously Presented) The machine-readable storage device of claim 64, wherein said database stores, for each of the plurality of service levels, a representation of available conversion free paths from the source node of said communication path to other access nodes in said optical network.

70. (Previously Presented) The machine-readable storage device of claim 64, wherein said transitioning includes:

moving traffic from the previous communication path to the new communication path; and

deallocating the previous communication path.

71. (Previously Presented) A machine-readable storage device having stored thereon data comprising:

a service level connectivity database for an access node of a wave division multiplexing optical network, wherein each link of said optical network includes a set of zero or more lamdas for each of a plurality of service levels, each of said plurality of service levels includes a set of zero of more possible end to end paths comprised of a series of two or more links that include one or more available lamdas of that service level, wherein allocated and unallocated lambda are considered available lambdas, wherein the service level connectivity database includes a separate service level topology structure for each of said plurality of service levels, wherein said separate service topology structure includes a smaller number of end to end paths than an entire network topology of said optical network, said separate service topology structure is based on a conversion

criteria, each of said plurality of service level topology structures storing the data for each of the possible end to end paths of that service level that end with said access node, said service level connectivity database including,

for each of the possible end to end paths that end with said access node,

data representing,

the series of links of that path; and

the lamdas of that path.

72. (Previously Presented) The machine-readable storage device of claim 71, further comprising:

a link state database including a link state structure for each node of said optical network adjacent said access node, each of said link state structures including the set of zero lambdas for each of the plurality of service levels.

73. (Cancelled)

74. (Previously Presented) The machine-readable storage device of claim 71, wherein each of said service level topology structures is a table.

75. (Previously Presented) The machine-readable storage device of claim 71, wherein each of said service level topology structures is a tree.

EVIDENCE APPENDIX

NONE.

RELATED PROCEEDINGS APPENDIX

NONE.